

CLAIMS

What is claimed is:

1. An optical receiver comprising:
 - 5 (a) an input for receiving an encoded optical signal that has been encoded with an encoding signature;
 - (b) a decoder connected to receive the encoded optical signal from the input, the decoder incorporating a decoding signature complementary to the encoding signature so as to decode the encoded optical signal to produce a decoded optical
10 signal having an autocorrelation peak and a background component; and
 - (c) a non-linear optical element connected to receive the decoded optical signal and enhance the autocorrelation peak relative to the background component by virtue of the autocorrelation peak having an intensity above a non-linear threshold of the non-linear optical element and the background component having an intensity
15 below the non-linear threshold of the non-linear optical element, thereby to enhance the decoded optical signal.
- I 2. A receiver according to claim 1, wherein the non-linear optical element is a non-linear optical loop mirror (NOLM).
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- II 3. A receiver according to claim 1, wherein the non-linear optical element is a semiconductor optical amplifier (SOA).
- III 4. A receiver according to claim 1, wherein the decoder comprises a refractive
25 index modulation induced grating.
5. A receiver according to claim 4, wherein the refractive index modulation induced grating is formed in an optical fiber.

6. A receiver according to claim 1, further comprising a dispersion compensator arranged to compensate for dispersion during transmission of the encoded optical signal.
- 5 7. A receiver according to claim 1, further comprising an amplifier arranged prior to the non-linear optical element and configured to supply the decoded optical signal to the non-linear optical element within a desired power range.
8. A receiver according to claim 1, wherein the decoder is arranged in reflection
10 in combination with a circulator.
9. A receiver according to claim 1, wherein the decoder is configured to decode a spread-spectrum encoded optical signal.
- 15 10. A receiver according to claim 1, wherein the decoder is configured to decode an OCDMA encoded optical signal.
11. An optical transmission system comprising:
 - (a) an optical transmitter including an encoder for generating encoded
20 optical signals;
 - (b) a transmission link for conveying the encoded optical signal from the optical transmitter; and
 - (c) an optical receiver according to any one of the preceding claims.
- 25 12. A method of decoding an encoded optical signal comprising:
 - (a) receiving an optical signal;
 - (b) decoding the encoded optical signal with a decoder to generate a decoded optical signal having an autocorrelation peak and an adjacent background component; and

(c) supplying the decoded optical signal to a non-linear optical element such that the autocorrelation peak has an intensity above a non-linear threshold of the non-linear optical element and the background component has an intensity below the non-linear threshold, thereby to enhance the autocorrelation peak relative to the background component.

13. A method according to claim 12, wherein the decoded optical signal is supplied to the non-linear optical element after amplification to ensure that the non-linear optical element performs to a desired specification.

14. A method according to claim 12, wherein the encoded optical signal is a spread-spectrum encoded optical signal.

15. A method according to claim 12, wherein the encoded optical signal is an OCDMA encoded optical signal.

16. A method according to claim 12, wherein the non-linear optical element is a non-linear optical loop mirror (NOLM).